

*7 Page* **ADVANCE PRESS PROOF**  
**FROM FORTHCOMING 1965 CATALOG**  
*28 Page*

## A COMPLETE LINE OF SOLID-STATE MULTI-RANGE VOLTMETERS

*Theta* **INSTRUMENT CORPORATION**  
**SADDLE BROOK • NEW JERSEY • 07663**

Telephone 201-487-3508 • TWX 201-488-9452

Regional Sales Manager: Vic Crisci

Western Division 1032 North Fairfax Ave., Los Angeles, California 90046

Telephone: (213) OL 6-1700 TWX: (213) 655-5567

Regional Sales Manager: Harold Steinberg

**For  
Those Who  
Are Perfectly  
Satisfied With Their  
Present Voltmeters,  
But ...**

# SOLID-STATE, MULTI-RANGE

## IF YOU ARE PERFECTLY SATISFIED WITH YOUR PRESENT VOLTMETER,

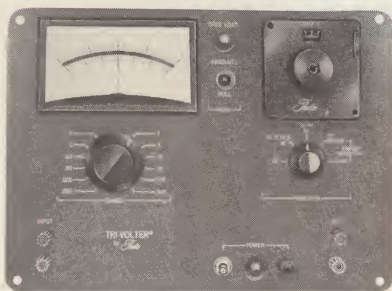
*but  
You  
Prefer:*

- Smaller, perhaps unusual sizes with uncompromising performance
- Portability and light weight
- No down-time reliability
- Militarized construction at sensible prices
- More, related measurements in less space

... then the Theta Voltmeter Series can surely fill your exact needs.

### TRI-VOLTER SERIES

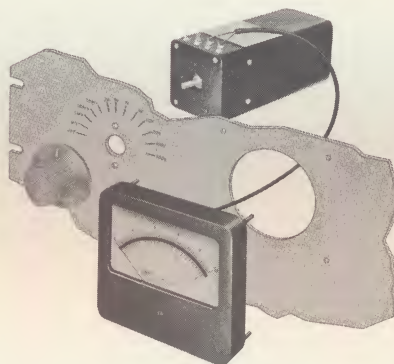
A versatile, new multimeter which combines the voltage-measuring capabilities of the Phase-Sensitive Voltmeter, AC Voltmeter, and DC Voltmeter. Also provides direct-reading of phase shift through  $360^\circ$ .



SEE PAGE 12

### MODULAR SERIES

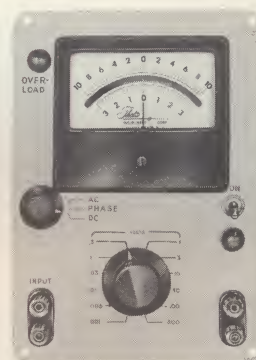
Built-in, midget voltmeters—AC, DC, or Phase-Sensitive—provide laboratory performance in the smallest possible space. These panel-mounted modules are preferred by console designers.



SEE PAGE 14

### CUSTOM SERIES

Choose any combination of off-the-shelf voltmeter modules—AC, DC, Phase-Sensitive—in a variety of physical formats. Provision for phase-shift measurements can also be included.



SEE PAGE 17

## BASIC SPECIFICATIONS

### AC Voltmeters (TRVM)

Sensitivity . . . . 1 MV full scale  
Accuracy . . . . . 2%  
Input Impedance . 2 megohms  
Ranges . . 1 MV through 300 V  
                  in 12 steps

### DC Voltmeters (DCVM)

Sensitivity . . . . 10 MV full scale  
Accuracy . . . . . 2%  
Input Impedance . 5 megohms  
Ranges . . 10 MV through 300 V  
                  in 10 steps

### Phase-Sensitive Voltmeters (PSVM)

Sensitivity . . . . 1 MV full scale  
Accuracy . . . . . 2%  
Input Impedance . 2 megohms  
Ranges . . 1 MV through 300 V  
                  in 12 steps



## NOTEWORTHY FEATURES ON ALL THETA VOLTMETERS

### FASTEST RESPONSE

Input signals which differ considerably in amplitude are rapidly read upon Theta voltmeters. For example, should a particular scale be saturated with 300 V and then a 1 MV signal inserted — the transients will settle out in less than half-a-second. Thus, a sequence of voltage measurements is actually performed in a shorter time.

### OVERLOAD IMMUNITY

Up to 350 V may be continuously inserted at the voltmeter input — even on the 1 MV scale — without any damage whatever to either the circuit or the meter movement.

### DC OUTPUTS FOR EXTRA TASKS

DC output from the voltmeter can be used to drive a relay, recording device, or digital voltmeter.

### RUGGED CONSTRUCTION

Withstands the extreme environmental conditions of most military specifications for ground support equipment. Printed circuit boards conform to the most rigorous NASA requirements.

### SOLID-STATE RELIABILITY

Fully transistorized design and conservative ratings assure longer life, less maintenance, less power drain, and more stability than vacuum tube counterparts. These instruments are ready for instant operation without warmup.

### AVOIDS GROUND-LOOP ERRORS

The signal and power circuits are fully isolated one from the other (except in the case of 28 V DC power options). If desired, leads may be commoned thus enabling you to carry wires to a single point for grounding.

### DRAMATIC SPACE SAVINGS

Through the use of miniature circuit components and negligible power dissipation, Theta voltmeters represent the smallest size consistent with easy operation and convenient maintenance.

### EASY TO SERVICE

Four facts simplify servicing of Theta voltmeters:

1. Full trouble-shooting data is furnished
2. Test points are readily accessible
3. All circuit boards are replaceable
4. All circuit boards are repairable

### SENSIBLE PRICES

Starting at \$320, Theta voltmeters are competitively priced. Included in the standard price is virtually full militarization. Operating, maintenance, and provisioning data accompanying each voltmeter will satisfy most military requirements.

### COMPLETELY SELF-CONTAINED

Power packs are never required — all power conversion is built-in. Outside attenuators are not needed — that too is integral.

### COMPLETE DOCUMENTATION

Available with each voltmeter is a 52 page manual covering theory, operation, maintenance, calibration, and spare parts. In its standard format, it will satisfy the data requirements of most military contracts.

### PROVEN CIRCUITRY

Theta voltmeters have achieved standards of dependability in major weapon-support systems. Stability and accuracy have been maintained under difficult and often unpredictable field conditions.



# ALL NEW, PORTABLE



## PHASE-SENSITIVE VOLTMETER AC VOLTMETER DC VOLTMETER



Theta's TRI-VOLTER is the first multimeter of its kind. In one compact instrument, you can measure with precision and ease:

- voltage ratios
- phase shift
- synchro/resolver nulls
- power factor
- total AC voltages
- fundamental AC voltages
- DC voltages
- in-phase voltages
- quadrature voltages
- impedance
- nulls from AC bridges
- nulls from DC bridges
- transducer nulls

### TRIPLE YOUR MEASUREMENT CAPABILITIES WITH THETA TRI-VOLTER

#### MEASURES ABSOLUTE VOLTAGES

AC, DC, and phase-modulated voltages are measured with an accuracy of 2% of full scale. The high-resolution, 6-inch meter scale lets you take full advantage of circuit precision.

#### DIRECT-READING PHASE SHIFT MEASUREMENTS

The phase shift (or phase difference) of a single-frequency signal with respect to a reference is directly displayed on a single dial. Measures any angle, 0° through 360°, continuously without the need to move decade switches.

#### NULLING WITHOUT SCALE CHANGING

As a null indicator (AC, DC, and phase-sensitive), the TRI-VOLTER provides a truly unique feature: scales need not be changed. In the null mode, a nonlinear circuit prevents off-scale indication. For example, you may choose to use the 1 MV range. Even though the nulling voltage varies between zero and 350 volts (AC or DC), its variation will appear on the meter without changing the position of the range switch. In the null vicinity, of course, full sensitivity is automatically restored.

#### NUMEROUS APPLICATIONS

- Laboratory
- Production Test
- System Support
- Service
- Field Test

#### GO COMPARISON SHOPPING

TRI-VOLTER performance equals or exceeds that of the best rival instruments. Yet, it occupies less space, has fewer controls, and costs less than equivalent phase-sensitive-voltmeters alone. It is the only instrument to offer the 3-IN-1 feature and the NULL-ABSOLUTE mode selection feature.



## SPECIFICATIONS

### Applies To All Operating Modes:

<b>Attenuator Ranges</b>	1 MV to 300 V in 12 steps (1 MV, 3 MV not operable in DC mode).
<b>Overload</b> .....	300 V AC or DC applied indefinitely at any setting.
<b>Meter Scale</b> .....	6 in. meter; 3-0-3 & 10-0-10 scales.
<b>Overload Indicator</b>	Lamp glows at 5X full-scale voltage.
<b>Power Required</b> ..	115V, 50-800 cps.
<b>Functions</b> .....	Phase-sensitive voltmeter, AC voltmeter, DC voltmeter, phase-shift.
<b>Null Mode</b> .....	Selected by panel switch. Non-linear scale with full sens. in vicinity of 0; 300 V FS. Use with any range switch setting.
<b>Dimensions</b> .....	8 in. high x 11 in. wide x 10 in. deep.
<b>Circuit</b> .....	Solid-State.

### Phase-Sensitive Voltmeter Section

<b>Input Impedance</b> ..	2 megohm min. on 1 MV, 3 MV, 10 MV, 30 MV scales; 4 megohm min. or others.
<b>Accuracy</b> .....	Within 2% of full scale.
<b>Resolution</b> .....	10 microvolts.
<b>Full-Scale Sensitivity</b> .....	1 MV.
<b>Operating Frequency</b> .....	400 cps nominal.
<b>Reference Required</b>	115 V $\pm 10\%$ , 400 $\pm 1$ cps, 15 ma. Internal phase-shifter adjustable through 360°.
<b>Quadrature Rejection</b> .....	250 to 1.

<b>Isolation</b> .....	Signal and reference inputs are isolated, but may be commoned.
<b>Harmonic Rejection</b>	40 db.
<b>Overload Capacity</b>	Full accuracy with 5X overload.

### AC Voltmeter Section

<b>Input Impedance</b> .	2 megohm min. on 1 MV, 3 MV, 10 MV, 30 MV scales; 4 megohm min. on others.
<b>Accuracy</b> .....	Within 2% of full scale.
<b>Resolution</b> .....	10 microvolts.
<b>Full-Scale Sensitivity</b> .....	1 MV.
<b>Frequency</b> .....	30 cps to 20 KC.
<b>Circuit Type</b> .....	Measures average AC; scale calibrated RMS for sine-wave input.
<b>Filter</b> .....	400 cps band-pass filter inserted or removed via front-panel switch.

### DC Voltmeter Section

<b>Input Resistance</b> ..	5 megohms min.
<b>Polarity Indication</b>	Marked on zero-centered scale.
<b>Accuracy</b> .....	Within 2% of full scale.
<b>Resolution</b> .....	100 microvolts.
<b>Full-Scale Sensitivity</b> .....	10 MV.

### Phase Generator Section

<b>Reference Required</b>	115 V $\pm 10\%$ , 400 $\pm 1$ cps.
<b>Phase Range</b> .....	0° - 360°, continuous, no stops.
<b>Phase Accuracy</b> ...	1°.

### Fully Militarized TRI-VOLTER Per MIL-T-21200B, Class 2

- Drip-proof
- 4¼" ruggedized meter
- -40°C to +55°C operating
- Passes 100% humidity
- Passes shock test
- Passes vibration
- MIL components

Size, 6.7 in. wide x 8.4 in. high x 6.5 in. deep. Wt., 7½ lbs.

Write for Bulletin 3-90

### ORDERING INFORMATION

<b>TRI-VOLTER:</b> .....	Model No. T-1
<b>Price:</b> .....	\$1,200
<b>Delivery:</b> .....	60 days
<b>Shipping Wt.:</b> .....	20 lb. approx.
<b>Warranty:</b> .....	1 year
<b>F.O.B.:</b> .....	Saddle Brook, N. J.
<b>Terms:</b> .....	Net 30 days

Many other custom modifications are available.



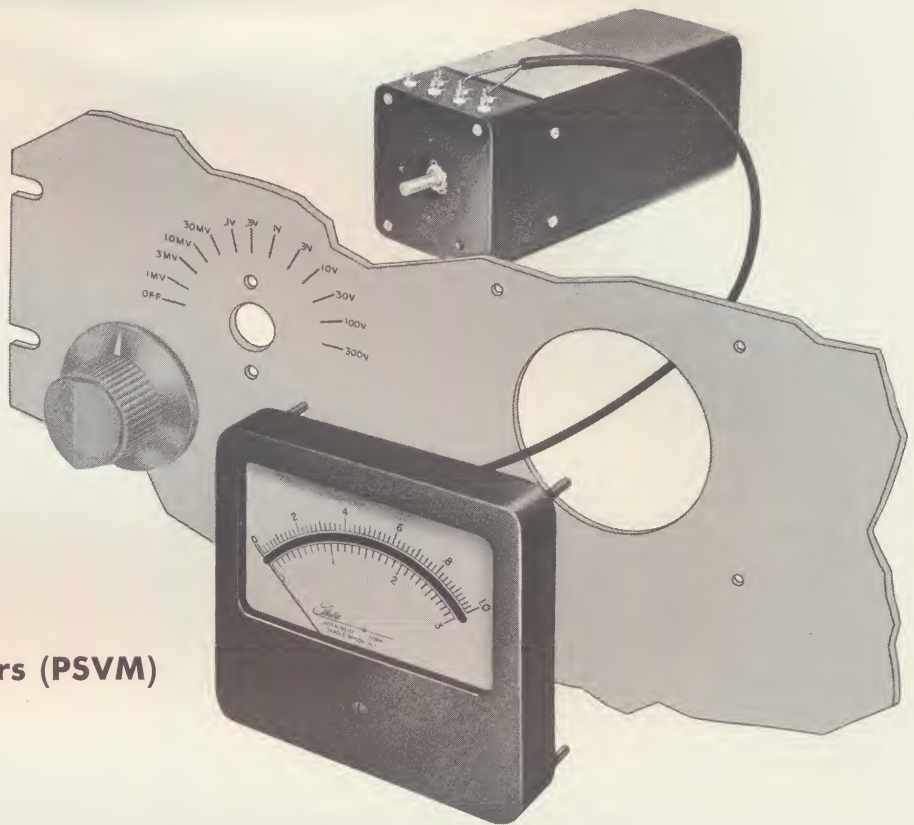
# PANEL-MOUNTED

Theta's panel-mounted voltmeters are sophisticated instruments which have been reduced to component simplicity. These modules are built into all kinds of test systems to simplify operation, conserve space, and enhance appearance.

Only the range switch protrudes through the panel. As a result, there need be no concern about matching finishes, knobs, or markings. Locate the meter (any style) to suit your human engineering and packaging requirements.

## AVAILABLE AS

- AC Voltmeters (TRVM)
- Phase-Sensitive Voltmeters (PSVM)
- DC Voltmeters (DCVM)



## FEATURES

### **SMALLEST, PANEL-MOUNTED METERS EVER PRESENTED**

With two easy-to-mount sections, panel space is most efficiently used. Mount the meter alongside, above, below, or away from the electronic package.

### **HUMAN ENGINEERED**

Many designed-for-use panels require meters at eye level and controls at hand level. Only with Theta solid-state voltmeters can this be done.

### **NEAT APPEARANCE**

Theta voltmeters are built-into your test panels. Problems of matching paint finishes, knobs, markings, and meter movements to the rest of your test system have been eliminated. Since the meter movement is a separate element, a style and size may be chosen to match the other panel meters being used.

### **CHOOSE YOUR OWN METER STYLE**

Theta stocks three sizes of rectangular, mirror-scale meter movements for use with solid-state voltmeters. Separation of electronics and meter allows the choice of any meter (electrical parameters must conform).

### **FRONT-PANEL MAINTENANCE**

Gain calibration is rarely required — when it is, merely insert a screwdriver through an access hole from the front of your panel.

### **FULL DOCUMENTATION**

A 52 page Instruction Manual accompanies each order. It covers installation, operation, maintenance, theory, and provisioning. At no additional charge, it satisfies most military data requirements.



# VOLTMETER MODULES

## SPECIFICATIONS

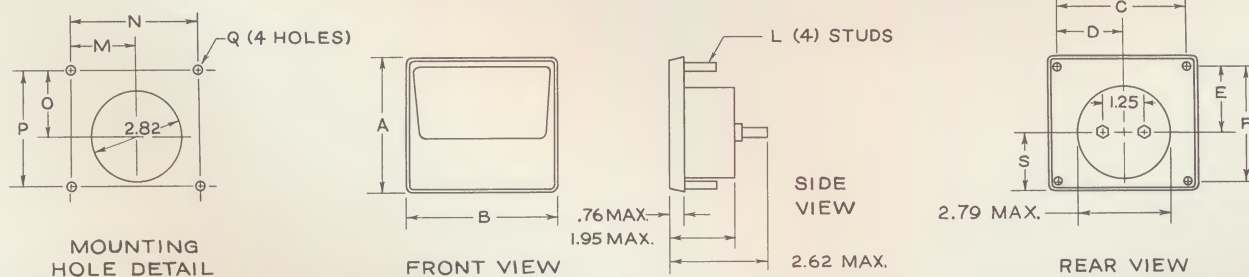
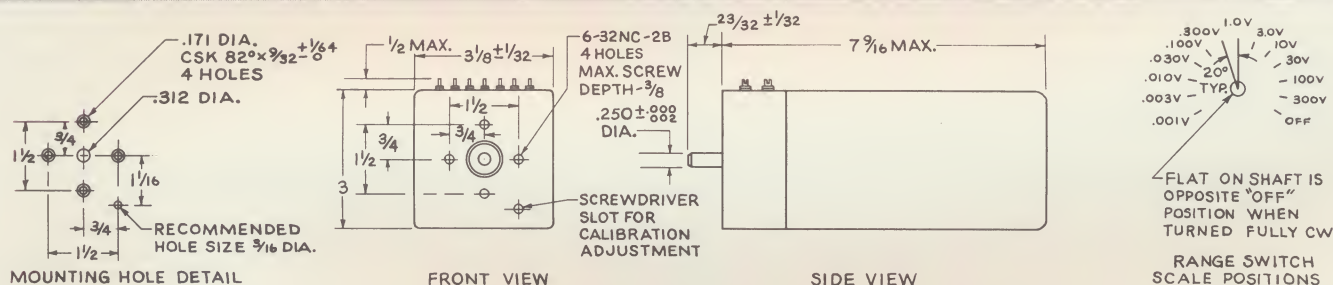
	Phase-Sensitive Voltmeter, Model PSVM <sup>5</sup>	AC Voltmeter, Model TRVM	DC Voltmeter, Model DCVM
Full-Scale Deflection <sup>1</sup>	1 MV		10 MV
Input Impedance	2 Meg $\Omega$ on 1 MV, 3 MV, 10 MV, 30 MV scales; others, 4 Meg $\Omega$		5 Meg $\Omega$
Accuracy <sup>2</sup>	2% FS		2% FS
Ranges	1 MV — 300V, 12 steps		10 MV — 300V, 10 steps
Frequency Response	60 cps — 2000 cps <sup>4</sup>	60 cps — 20Kc	—
Resolution <sup>3</sup>	5 microvolts	10 microvolts	50 microvolts
Reference Required	1 only, 26V or 115V, signal freq.; 50 K $\Omega$ input	None	None
DC Output	$\pm 60$ MV across 600 $\Omega$	120 MV across 600 $\Omega$	$\pm 60$ MV across 600 $\Omega$
Signal Overload	No damage with 350V AC or DC applied indefinitely on any range		
Power Required	115V $\pm 5\%$ , 60-800 cps, 100 ma. max.		
Isolation	Complete isolation between pwr, sig., ref. inputs		

## NOTES

1. With range switch in most sensitive position
2. Includes meter-movement error
3. With 6-inch meter movement
4. Freq. resp. is 200 cps — 2 KC with 115V reference option

5. PSVM Options  
Signal Filter: Bandpass; 3 db down at  $\pm 7\%$  of nominal freq.; 40db down at 3rd harm.  
Overload Alarm: DPDT relay, 2 amp contacts.  
Enerized when signal exceeds 2X FS.

## OUTLINE DRAWINGS



THETA PART NO.		DIM A	DIM B	DIM C	DIM D	DIM E	DIM F	THD L	DIM M	DIM N	DIM O	DIM P	DIM Q	DIM S
C-759-1 C-770-1		3.12	3.27	2.250	1.125	1.125	2.250	#4-40 x .62	1.12	2.25	1.12	2.25	.125	1.60
C-759-2 C-770-2		4.26	4.71	4.000	2.000	2.020	3.560	#6-32 x .62	2.000	4.000	2.020	3.560	.156	1.89
C-759-3 C-770-3		4.36	5.75	5.250	2.625	2.150	3.000	#6-32 x .62	2.625	5.250	2.150	3.000	.156	1.69

**MORE ON PAGE 16**



# HUNDREDS OF CUSTOM VOLTMETERS

## ASSEMBLED FROM OFF-THE-SHELF MODULES

### Combine Several Different Voltmeters In A Special Package At Moderate Cost and Rapid Delivery

Custom voltmeters to suit your exact needs are rapidly produced by Theta through use of the many panel-mounted modules shown throughout this catalog. Whether the need is for special physical layout or for multi-purpose voltmeters, modules are rapidly and economically integrated into a single compact instrument. Any of the voltmeters shown on pages 12 — 16 as well as the Phase Generators shown on pages 20 — 26 may be incorporated in the custom voltmeter.

### Features:

- One, two, three, or four discrete voltage-measuring functions are combined in a single instrument to meet your requirements.
- Instruments are mounted and housed in packages to suit your equipment needs.
- Rapid delivery of custom designs.
- Complete operating, calibration, servicing, and provisioning data supplied at no extra cost.

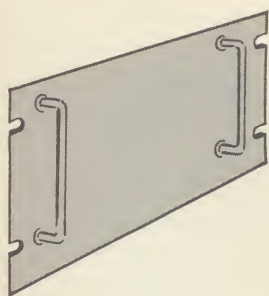
### NINE BASIC VOLTMETER COMBINATIONS TO CHOOSE FROM

PSVM	TRVM	DCVM	PSVM PG	PSVM TRVM	PSVM TRVM PG	PSVM DCVM	PSVM DCVM PG	TRVM DCVM
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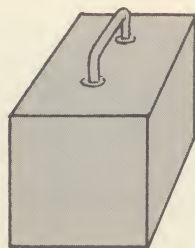
PSVM = Phase-Sensitive Voltmeter  
 TRVM = AC Voltmeter  
 DCVM = DC Voltmeter  
 PG = Phase Generator

Performance characteristics of modular voltmeters are given on page 15; phase generators, page 25. Each module of the custom voltmeter can be specified with the many options which are also listed on the above pages.

### FIVE PACKAGING FORMATS TO CHOOSE FROM



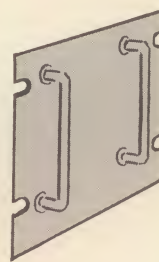
Standard 19 in. panel



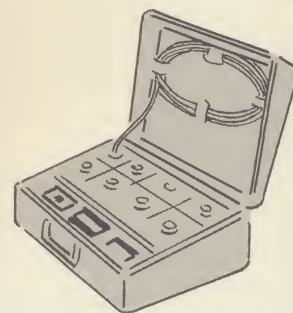
Portable Case



Panel Insert



Standard 9 1/2 in. panel



Transit Case

### STANDARD PHYSICAL SPECIFICATIONS

Panel Material ..... Al, 3/16 in.  
 Finish ..... Light gray baked enamel  
 Markings ..... Black  
 Power Controls  
 ON-OFF Switch, Indicator Light, Fuse

### OTHER PHYSICAL VARIATIONS

- Engraved Panel-Markings
- Special Finish
- Special Connectors
- Drip-Proofing
- Ruggedized Meter Movements